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# Electrophysiological severity of carpal tunnel syndrome and body composition measurement

Carpal tunnel syndrome and body composition measurement

Nuray Can Usta[1], Gökhan Peker[2]
[1] Department of Neurology
[2] Department of Orthopedia, University of Health Sciences, Trabzon Kanuni Training and Research Hospital, Trabzon, Turkey

**Abstract**
Aim: In this study, it was aimed to determine the relationship between electrophysiological severity findings and body composition measurement (BCM) in patients with carpal tunnel syndrome (CTS).
Material and Methods: In this retrospective study, electromyography (EMG)-diagnosed CTS patients who had BCM were evaluated. In addition to general demographic data, total fat mass (TFM), total lean mass (TLM), total muscle mass (TMM), arm fat mass (AFM), arm lean mass (ALM) and arm muscle mass (AMM) data were recorded. According to their electrophysiological results, CTS patients were divided into three groups: mild, moderate, and severe.
Results: The study group consisted of 186 hands of 100 CTS patients. A significant association was detected between the increase in TFM (p<0.01), AFM (p<0.01), ALM (p=0.041), and AMM (p=0.029) among the BCM data and disease severity. There was a difference between CTS patient groups in terms of TFM, AFM, ALM and AMM values (p<0.001). A significant but weak negative correlation was found between TFM and AFM and the median nerve EMG study (p<0.05).
Discussion: Our results revealed that the relationship between CTS disease severity and BMI increased not only with total adiposity in the body, but also with lean and muscle mass in the arm, especially in the arm fat mass. An increase in AFM value may help as a follow-up or predictive metric for the CTS.

**Keywords**
Carpal Tunnel Syndrome, Body Composition Measurements, Electromyography, Obesity

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Corresponding Author: Nuray Can Usta, Department of Neurology, University of Health Sciences, Trabzon Kanuni Training and Research Hospital, 61040, Trabzon, Turkey.
E-mail: dr.nuraycan@hotmail.com P: +90 505 886 06 08
Corresponding Author ORCID ID: https://orcid.org/0000-0001-9238-1194
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## Introduction

Carpal tunnel syndrome (CTS) is the most common form of peripheral nerve entrapment neuropathy [1]. This condition occurs due to the compression of the median nerve in the carpal tunnel [2]. The prevalence is approximately 1- 6% in the adult population [3]. Patients complain of wrist and arm pain due to paresthesia in the hand [4]. CTS is typically bilateral both clinically and electrically. Women are affected more often than men. Paresthesia complaints related to CTS occur during routine activities such as driving a car, holding a phone, book or newspaper or at night [5].

It is known that the risk of developing CTS increases in occupations or activities that require repeated hand use. Other risk factors for CTS include advanced age, pregnancy, systemic illnesses, including thyroid disease and diabetes, local causes such as rheumatic diseases, and occupational exposure [6,7]. Obesity is another etiological factor for CTS [8]. The most used method for obesity assessment is body mass index (BMI, kg/m2). BMI ≥ 30 is defined as obesity [9]. In different studies, it has been reported that waist circumference measurements, anthropometric measurements, may be effective as an alternative to BMI in predicting obesity risk [10,11]. Although waist circumference and BMI measurement provide information about the overall increase in adipose tissue, they cannot provide detailed data on local fat and muscle mass. Another method used to assess obesity in recent years is body composition measurement (BCM) [8]. BCM is used to assess the relationship between nutritional supplements and cardiovascular diseases, osteoporosis, and osteoarthritis, as well as a marker for athletic health and performance [9-12]. BCM is a non-invasive method that evaluates lean mass and muscular mass, which cannot be evaluated by measuring BMI and waist circumference assessment [13].

There are limited studies examining the relationship between electrophysiological severity of CTS and body composition measurements [14-16]. These studies have shown that there is a relationship between personal anthropometric measurements and the severity of CTS. It was concluded that the use of multiple obesity indices would be useful in reconstructing the relationship between CTS and body composition. BMI is mostly used in previous studies examining the relationship between obesity and CTS. In this study, we aimed to investigate the relationship between body fat mass, lean mass, and muscle mass, as well as their distribution in the arm, and the electrophysiological severity of CTS.

## Material and Methods

Ethical approval was obtained from the institutional ethics committee on non-pharmacological clinical research (Number: 2022/16). This study was designed as a retrospective review of the medical records of patients who were referred to the obesity outpatient clinic between August 2021 and December 2021 and were diagnosed with CTS confirmed by electromyography (EMG) within the last month. All patients included in the study were invited for a control visit, neurological examinations were performed and missing data were completed. The study included patients who had received BCM and had CTS diagnosed by an EMG. The exclusion criteria were the presence of another entrapment neuropathy such as ulnar or radial neuropathy in the upper extremity, the presence of polyneuropathy, the presence of brachial plexopathy, a history of upper-extremity trauma or surgery, the presence of diabetes, the presence of other neurological diseases such as multiple sclerosis, amyotrophic lateral sclerosis, the presence of pregnancy, thyroid or rheumatic disease, the presence of malignancy in the last 5 years, incomplete medical records.

General demographic data of the patients, including age, sex, BMI, smoking status, occupation, presence of hypertension, and disease duration, were recorded.

Electromyography (EMG) recordings were performed using a Nihon Kohden Neuropack S1 MEB-9400K device. According to the recommendations of the American Association of Electrodiagnostic Medicine, CTS was identified [17]. The room temperature was 25° during the CTS examination, and the hand temperature ranged from 31° to 34°. Surface electrode recording and the antidromic supramaximal percutaneous stimulation method were used. Sensory nerve action potentials (SNAP) and motor action potentials (CMAP) of median and ulnar nerves were analyzed. Median CMAP was performed with wrist and antecubital fossa stimulation of abductor pollicis brevis muscle. Ulnar CMAP was recorded with wrist and grove stimulation of the abductor digiti minimi muscle. It was obtained by stimulating the ring electrodes placed on the median SNAP digit 2 at the wrist level. For ulnar SNAP, ring electrodes were placed on digit 5 and stimulation was done at the wrist level. In addition, digit 4 median-ulnar peak latencies were recorded. All patients were recorded bilaterally. The hand without CTS was excluded from the study.

We used a validated 5-stage scale to assess the electrophysiological severity of CTS. We classified the severity of CTS by reducing the 5-point scale for electrophysiological because of the limited sample in three groups as mild (stages 1-2), moderate (stage 3), and severe (stages 4-5). Mild CTS was defined as median SNAP latency greater than 2.5 ms or difference between median-ulnar SNAP peak latencies >0.5 ms. Moderate CTS: median CMAP latency was prolonger than 4.0 ms and median SNAP latency was prolonged than 2.5 ms. Severe CTS: no median SNAP and median CMAP amplitude <5 mV or latency >5.5 ms, or no median SNAP and CMAP.

BCM was performed using a TANITA MC 780 MA bioimpedance body composition analyzer, which works as a low amperage current from the tips of the toes and measure the voltage taken from the tips of the fingers. Different impedance measurements were obtained in the form of fat, lean, and muscle mass compartments of the whole body, right leg, left leg, right arm, and left arm, respectively [18]. The data obtained from the BCM included total fat mass (TFM), total lean mass (TLM), total muscle mass (TMM), arm fat mass (AFM), arm lean mass (ALM), and arm muscle mass (AMM) data.

### *Statistical Analysis*

Statistical analyses were performed using SPSS (version 22.0) for Windows. Descriptive analyses were presented as mean ± standard deviation. The quantitative data distribution was tested using the Shapiro-Wilk test, and the data distribution was consistent with the non-parametric test. The Mann-Whitney U test was used for the quantitative comparison of two independent groups. The chi-square test was used to compare qualitative data. Fischer's exact chi-square test was used when the number of observations was below 5 in the Chi-square test. Statistical significance was set at P < 0.05. The tests have been added and explained.

## Results

The study group consisted of 186 hands of 100 patients, including 84 (84%) females and 16 (16%) males whose CTS was detected with EMG. The average age of the patients was 52.12±11.29 (25-82) years. The mean BMI was 32.12±5.61 kg/m2. The number of smokers was 24 (24%), and the majority of the patients were housewives (n=45, 45%). The duration of CTS disease was 2.57±1.51 (1-10) years. Patient demographic data are presented in Table 1.

CTS electrophysiological severity stage was mild in 62 hands (26.3%), moderate in 88 hands (37.3%), severe in 38 hands (15.4%). BMI values were 29.75±0.65 kg/m2, 31.84±0.51 kg/m2, and 37.00±0.91 kg/m2 (mild, moderate and severe CTS groups respectively) (p<0.001).

**Table 1.** General demographic data of the patients.

| | | CTS patients (n=100) |
|---|---|---|
| Age (years) | | 52.12±11.29 |
| Gender | Female | 84 (84%) |
| | Male | 16 (16%) |
| BMI (kg/m2) | | 32.12±11.29 |
| Smoking n (%) | | 24 (24%) |
| Occupation (housewife/other professions), n % | | 45/55 (45/55) |
| Those with hypertension, n % | | 34 (34) |
| History of thyroid disease, n % | | 12(12) |
| Disease duration (years) | | 2.57±1.51 |

Abbreviations: CTS; carpal tunnel syndrome; BMI; body mass index

**Table 2.** The BCM data according to the severity of CTS disease.

| CTS disease severity class | Stage 2 | Stage 3 | Stage 4 | P* |
|---|---|---|---|---|
| Hand, n (%) | 62 (26.3) | 88 (37.3) | 36 (15.3) | |
| BMI (kg/m2) | 29.75±5.10 | 30.90±6.68 | 36.91±5.53 | <0.01 |
| Disease duration (years) | 2.47±1.07 | 2.51±1.31 | 2.51±2.53 | 0.638 |
| Total fat mass (kg) | 25.30±9.46 | 27.59±9.67 | 34.42±8.46 | <0.01 |
| Total lean mass (kg) | 53.97±8.38 | 55.10±9.05 | 53.26±14.44 | 0.708 |
| Total muscle mass (kg) | 57.97±51.11 | 56.62±43.36 | 53.55±8.14 | 0.590 |
| Arm fat mass (kg) | 1.62±0.86 | 1.79±0.93 | 2.71±1.11 | <0.01 |
| Arm lean mass (kg) | 2.76±0.59 | 2.93±0.70 | 2.94±0.45 | 0.041 |
| Total muscle mass (kg) | 2.64±0.54 | 2.79±0.64 | 2.84±0.46 | 0.029 |

*Kruskal-Wallis Test, Abbreviations: CTS; carpal tunnel syndrome, BCM; body composition measurement, BMI; body mass index

When CTS patients were compared as 3 groups in terms of BCM data, there was a difference between the groups in terms of TFM, AFM, ALM and AMM values (p<0.001). The comparison of the 3 groups is demonstrated in Table 2. In the pairwise comparison of BCM data in CTS patients; TFM, AFM, ALM and AMM values in comparison of mild and severe CTS patients; in the comparison of moderate and severe CTS patients, it was determined that TFM and FM values increased as the disease severity increased. Median nerve EMG data (SNAP and CMAP latency, amplitude, and velocity ratio) analyzed by TFM and AFM showed a substantial but weak negative correlation when the association between EMG data and BCM data was evaluated (p<0.05). Correlation relations are shown in Table 3.

## Discussion

This study examined the association between CTS patient electrophysiological severity and BCM data. It was shown that TFM, AFM, AMM, and ALM values from BCM data increased as the disease severity of CTS patients categorized according to their electrophysiological findings increased. In the two-group comparison, patients with mild and severe CTS showed differences in TFM, AFM, ALM, and AMM values, whereas patients with moderate and severe CTS showed differences in TFM and AFM values.

When the data from the BCM results and the electrophysiological results of the median nerve were analyzed, a significant but weak correlation with the TFM value was observed for nearly all of the median sensory and motor nerves. Moreover, a significant correlation was found between AFM and all parameters of median SNAP and median CMAP amplitude, and between ALM and AMM, similar to median SNAP amplitude, conduction velocity and median CMAP conduction velocity. Among the electrophysiological findings, a significant difference was observed between the median SNAP amplitude and conduction velocity for the TFM, AFM, ALM, and AMM.

Although obesity is considered a predisposing factor for CTS, there are studies showing different results in the literature [7,19-22]. Some previous studies have shown that obesity is not a risk factor for CTS. Although Shiri et al. reported that CTS may be seen twice as often in obese people in their study, Blandn's study suggested that this could only be true in people younger than 63 years of age [19,20]. The prevalence of obesity in patients with CTS is between 26.8% and 37% [7,21,22]. Adebayo et al. examined the prevalence of severe CTS among obese and overweight people, and stated that obesity is not a predictor for severe CTS, but adiposity may be investigated as an indicator [8]. Therefore, underlining that BMI may be more useful in the clinical evaluation of CTS reveals the importance of our study. Furthermore, differences in body weight and BMI may cause abnormalities in electrophysiological findings such as median nerve distal motor latency [18]. These different results suggest that new studies are required to explain the association between obesity and CTS.

Adebayo et al. examined the prevalence of severe CTS among obese and overweight people and stated that obesity is not a predictor for severe CTS, but adiposity formed by fat structures may be investigated as an indicator [8]. Therefore, underlining that fat mass may be more useful in the clinical evaluation

**Table 3.** Comparison of body composition measurements (BCM) data with electromyography (EMG) findings.

| | | | M SNAP latency (ms) | M SNAP amplitude (uV) | M SNAP conduction velocity (m/s) | M CMAP latency (ms) | M CMAP distal amplitude (mV) | M CMAP proximal amplitude (mV) | M CMAP conduction velocity (m/s) |
|---|---|---|---|---|---|---|---|---|---|
| Spearman's rho | TOTAL FAT MASS (KG) | Correlation Coefficient | -0,209** | -0,237** | -0,277** | 0,132 | -0,194** | -0,200** | -0,199** |
| | | Sig. (2-tailed) | 0,004 | 0,001 | 0,000 | 0,075 | 0,008 | 0,006 | 0,007 |
| | | N | 184 | 184 | 184 | 184 | 184 | 184 | 184 |
| | TOTAL LEAN MASS (KG) | Correlation Coefficient | 0,019 | -0,023 | -0,013 | 0,021 | -0,011 | -0,029 | -0,124 |
| | | Sig. (2-tailed) | 0,803 | 0,756 | 0,866 | 0,778 | 0,880 | 0,696 | 0,094 |
| | | N | 184 | 184 | 184 | 184 | 184 | 184 | 184 |
| | TOTAL MUSCLE MASS (KG) | Correlation Coefficient | -0,038 | -0,043 | -0,034 | 0,033 | -0,021 | -0,033 | -0,165* |
| | | Sig. (2-tailed) | 0,613 | 0,565 | 0,646 | 0,653 | 0,774 | 0,656 | 0,025 |
| | | N | 184 | 184 | 184 | 184 | 184 | 184 | 184 |
| | ARM FAT MASS (KG) | Correlation Coefficient | -0,242** | -0,241** | -0,319** | 0,134 | -0,241** | -0,251** | -0,145* |
| | | Sig. (2-tailed) | 0,001 | 0,001 | 0,000 | 0,07 | 0,001 | 0,001 | 0,050 |
| | | N | 184 | 184 | 184 | 184 | 184 | 184 | 184 |
| | ARM LEAN MASS (KG) | Correlation Coefficient | 0,002 | -0,187* | -0,159* | 0,121 | -0,12 | -0,124 | -0,230** |
| | | Sig. (2-tailed) | 0,979 | 0,011 | 0,031 | 0,103 | 0,106 | 0,093 | 0,002 |
| | | N | 184 | 184 | 184 | 184 | 184 | 184 | 184 |
| | ARM MUSCLE MASS (KG) | Correlation Coefficient | -0,011 | -0,200** | -0,163* | 0,120 | -0,131 | -0,135 | -0,239** |
| | | Sig. (2-tailed) | 0,877 | 0,006 | 0,027 | 0,104 | 0,076 | 0,067 | 0,001 |
| | | N | 184 | 184 | 184 | 184 | 184 | 184 | 184 |

*. Correlation is significant at the 0.05 level (2-tailed).**. Correlation is significant at the 0.01 level (2-tailed). Abbreviations: M; Median, SNAP; Sensory Nerve Action Potential, CMAP; Compound Muscle Action Potential

of CTS reveals the importance of our study. Furthermore, differences in body weight and BMI may cause abnormalities in electrophysiological findings such as median nerve distal motor latency [18]. These different results suggest that new studies are required to explain the association between obesity and CTS.

Radecki suggested that an increase in BMI may cause an increase in pressure at the carpal tunnel level of the median nerve as a result of increased blood flow to the translocated upper body, including the thorax and arms [23]. However, no association was found between obesity and intra-carpal tunnel pressure and median nerve cross-sectional area in another study conducted by Werner et al. No association was found between BMI and the degree of fibrosis in the tenosynovium or the severity of edema in another previous study [24]. These studies were based on hypotheses attempting to explain the conditions associated with CTS severity due to local causes; however, sufficient evidence was not found. In our study, however, a significant correlation was found between the increase in arm fat mass and the EMG stage of CTS.

BMI may cause poor or sometimes false results as an indicator of adiposity [16]. This has led to total, visceral, and segmental body composition measurements, which are considered a more reliable method [16]. Habib et al. detected a significant association between CTS severity and BMI, BMI, body fat mass (BFM), TFM, and TF% in their study. These data are in line with those of our study, and an association was also revealed between AFM, ALM, AMM, and disease severity. It was noted that as the severity of the disease increased, BMI also increased. This suggests that AFM, which is a marker of the increase in local adipose tissue, is significantly associated with the severity of CTS disease and that AFM can be used as a predictive and follow-up tool for CTS severity.

Among all the data obtained with BCM, parameters that were significantly related to EMG findings were the M SNAP amplitude and conduction velocity. Habib et al. found visceral fat mass to be an independent marker of disease severity and prolongation of median nerve latency in their study. In contrast, a decrease in amplitude and slowdown in conduction velocity were found to be important markers for all parameters of M SNAP in this study. We believe that this result will be more clearly demonstrated by further studies that compare electrophysiological parameters and BMI in patients with CTS. A study examining EMG findings of obese CTS patients showed that parameters such as median nerve sensory latency, prolongation of distal motor latency, and slowing of conduction velocity were more abnormal than those in non-obese CTS patients [25]. In the aforementioned study, moderately severe CTS was detected mostly in obese patients; however, severe CTS was detected in non-obese patients, and it was concluded that obesity had no effect on CTS severity. The same study suggested that adiposity should be evaluated with markers other than obesity.

### *Conclusion*

Our results revealed that the relationship between CTS disease severity and BMI increased not only with total adiposity in the body, but also with lean and muscle mass in the arm, especially in the arm fat mass. An increase in AFM value might help as a follow-up or predictive metric for the CTS. As a result, it was determined that more extensive studies are needed to investigate the local CTS etiologic causes.

***Scientific Responsibility Statement***

*The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.*

***Animal and human rights statement***

*All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.*

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***Conflict of interest***

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***References***

*1. Padua L, Coraci D, Erra C, Pazzaglia C, Paolasso I, Loreti C, et al. Carpal tunnel syndrome: clinical features, diagnosis, and management. Lancet Neurol. 2016;15(12):1273-84.*

*2. Wright AR, Atkinson RE. Carpal Tunnel Syndrome: An Update for the Primary Care Physician. Hawaii J Health Soc Welf. 2019;78(11 Suppl. 2):6-10.*

*3. Razavi AS, Karimi N, Bashiri F. The relationship of serum lipid profiles and obesity with the severity of carpal tunnel syndrome. Pan Afr Med J. 2021;39:90.*

*4. Genova A, Dix O, Saefan A, Thakur M, Hassan A. Carpal Tunnel Syndrome: A Review of Literature. Cureus. 2020;12(3):e7333.*

*5. Jablecki CK, Andary MT, Floeter MK, Miller RG, Quartly CA, Vennix MJ, et al. American Association of Electrodiagnostic Medicine; American Academy of Neurology; American Academy of Physical Medicine and Rehabilitation. Practice parameter: Electrodiagnostic studies in carpal tunnel syndrome. Report of the American Association of Electrodiagnostic Medicine, American Academy of Neurology, and the American Academy of Physical Medicine and Rehabilitation. Neurology. 2002;58(11):1589-92.*

*6. Mansoor S, Siddiqui M, Mateen F, Saadat S, Khan ZH, Zahid M, et al. Prevalence of Obesity in Carpal Tunnel Syndrome Patients: A Cross-Sectional Survey. Cureus. 2017;9(7):e1519.*

*7. Mondelli M, Curti S, Farioli A, Aretini A, Ginanneschi F, Greco G, et al. Anthropometric measurements as a screening test for carpal tunnel syndrome: receiver operating characteristic curves and accuracy. Arthritis Care Res (Hoboken). 2015;67(5):691-700.*

*8. Adebayo PB, Mwakabatika RE, Mazoko MC, Taiwo FT, Ali AJ, Zehri AA. Relationship Between Obesity and Severity of Carpal Tunnel Syndrome in Tanzania. Metab Syndr Relat Disord. 2020;18(10):485-92.*

*9. Borga M, West J, Bell JD, Harvey NC, Romu T, Heymsfield SB, et al. Advanced body composition assessment: from body mass index to body composition profiling. J Investig Med. 2018;66(5):1-9.*

*10. Plastino M, Fava A, Carmela C, De Bartolo M, Ermio C, Cristiano D, et al. Insulin resistance increases risk of carpal tunnel syndrome: a case-control study. J Peripher Nerv Syst. 2011;16(3):186-90.*

*11. Mondelli M, Aretini A, Ginanneschi F, Greco G, Mattioli S. Waist circumference and waist-to-hip ratio in carpal tunnel syndrome: a case-control study. J Neurol Sci. 2014;338(1-2):207-13.*

*12. Kuriyan R. Body composition techniques. Indian J Med Res. 2018;148(5):648-58.*

*13. Campa F, Toselli S, Mazzilli M, Gobbo LA, Coratella G. Assessment of Body Composition in Athletes: A Narrative Review of Available Methods with Special Reference to Quantitative and Qualitative Bioimpedance Analysis. Nutrients. 2021;13(5):1620.*

*14. Shiri R, Pourmemari MH, Falah-Hassani K, Viikari-Juntura E. The effect of excess body mass on the risk of carpal tunnel syndrome: a meta-analysis of 58 studies. Obes Rev. 2015;16(12):2002-8.*

*15. Mokhtarinia HR, Parsons D, Bain CR, Gabel CP. Independent risk factors of carpal tunnel syndrome: Assessment of body mass index, hand, wrist and finger anthropometric measurements. Work. 2022;73(1):157-64.*

*16. Habib SS, Alanazy MH. Predictive Value of Markers of Adiposity in Carpal Tunnel Syndrome: A Clinical and Electrophysiological Evaluation. J Coll Physicians Surg Pak. 2020;30(8):828-32.*

*17. Stevens JC. AAEM minimonograph #26: the electrodiagnosis of carpal tunnel syndrome. American Association of Electrodiagnostic Medicine. Muscle Nerve. 1997;20(12):1477-86.*

*18. Buschbacher RM. Mixed nerve conduction studies of the median and ulnar nerves. Am J Phys Med Rehabil. 1999;78(Suppl. 6):S69-74.*

*19. Bland JD. The relationship of obesity, age, and carpal tunnel syndrome: more complex than was thought? Muscle Nerve. 2005;32(4):527-32.*

*20. Shiri R, Pourmemari MH, Falah-Hassani K, Viikari-Juntura E. The effect of excess body mass on the risk of carpal tunnel syndrome: a meta-analysis of 58 studies. Obes Rev. 2015;16(12):1094-104.*

*21. Becker J, Nora DB, Gomes I, Stringari FF, Seitensus R, Panosso JS, et al. An evaluation of gender, obesity, age and diabetes mellitus as risk factors for carpal tunnel syndrome. Clin Neurophysiol. 2002;113(9):1429-34.*

*22. Karpitskaya Y, Novak CB, Mackinnon SE. Prevalence of smoking, obesity, diabetes mellitus, and thyroid disease in patients with carpal tunnel syndrome. Ann Plast Surg. 2002;48(3):269-73.*

*23. Radecki P. Personal factors and blood volume movement in causation of median neuropathy at the carpal tunnel. A commentary. Am J Phys Med Rehabil. 1996;75(3):235-8.*

*24. Werner RA, Jacobson JA, Jamadar DA. Influence of body mass index on median nerve function, carpal canal pressure, and cross-sectional area of the median nerve. Muscle Nerve. 2004;30(4):481-5.*

*25. Gazioglu S, Boz C, Cakmak VA. Electrodiagnosis of carpal tunnel syndrome in patients with diabetic polyneuropathy. Clin Neurophysiol. 2011;122(7):1463-9.*

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